

**REMARKS**

Claims 2-18 are all the claims presently pending in the application. Claims 3-15 are added to claim additional features of the invention. Claim 1 is canceled. No new matter is added.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

The rejection is respectfully traversed in the following discussion.

**I. THE CLAIMED INVENTION**

An exemplary aspect of the claimed invention (e.g. as recited in claim 3) is directed to a method of sintering a rod-shaped porous glass base material in a furnace core tube, the furnace core tube having a heating section that is concentrically surrounded by a heater of a heating furnace and a preheating section that is surrounded by an insulating member of the heating furnace, the insulating member serving with the furnace core tube to enclose the heater, the method including hanging the rod-shaped porous glass base material in the furnace core tube, heating the preheating sections of the furnace core tube by heating the heater to a sintering temperature, and lowering the rod-shaped porous glass base material through the preheating section in a period of time being greater than or equal to 4.5 hours, and through the heating section, the rod-shaped porous glass base material thereby being sintered into a transparent glass.

In a conventional method of sintering a rod-shaped porous glass base material, a slight insufficiency in an application of thermal energy to the rod-shaped porous glass base material may result in a chain reaction of events resulting in core displacement of the rod-shaped porous glass base material and elliptical deformation of the rod-shaped porous glass base material's cross-sectional shape. This largely is due to temperature variations occurring within the rod-shaped porous glass base material while heating. These displacements and deformations result in the rod-shaped porous glass base material being subject to connection loss. (Application at paragraphs [0004]-[0006]).

On the other hand, an exemplary embodiment of the claimed invention may include a method of sintering a rod-shaped porous glass base material in a furnace core tube, the furnace core tube having a heating section that is concentrically surrounded by a heater of a heating

furnace and a preheating section that is surrounded by an insulating member of the heating furnace, the insulating member serving with the furnace core tube to enclose the heater, the method including lowering the rod-shaped porous glass base material through the preheating section in a period of time being greater than or equal to 4.5 hours, and through the heating section, the rod-shaped porous glass base material thereby being sintered into a transparent glass. (Application at paragraph [0014]). This exemplary feature may provide a method of sintering a rod-shaped porous glass base material in which core displacement of the rod-shaped porous glass base material and elliptical deformation of the rod-shaped porous glass base material's cross-sectional shape is reduced. (Application at paragraph [0011]).

## **II. THE PRIOR ART REJECTION – The Alleged Kamio, Sarkar, Walczak, Glodis, and Shimotakahara Combination**

Kamio discloses a method for sintering a porous-glass material to form a glass base material. (Kamio at Abstract). Sarkar discloses low signal attenuation optical fibers and methods for making such fibers. (Sarkar at Abstract). Walczak discloses a method of producing a doped optical fiber preform. (Walczak at Abstract). Glodis discloses a large optical preform. (Glodis at Abstract). Shimotakahara discloses a process for producing an optical fiber preform. (Shimotakahara at Abstract). The Examiner alleges that a combination of Kamio, Sarkar, Walczak, Glodis, and Shimotakahara makes the claimed invention obvious.

However, even assuming (arguendo) that one of ordinary skill in the art would have combined Kamio, Sarkar, Walczak, Glodis, and Shimotakahara, the resultant combination fails to teach each and every element of the claimed invention. Specifically, Kamio, Sarkar, Walczak, Glodis, and Shimotakahara – either applied individually or in combination – fails to teach or suggest a method of sintering a rod-shaped porous glass base material in a furnace core tube, the furnace core tube having a heating section that is concentrically surrounded by a heater of a heating furnace and a preheating section that is surrounded by an insulating member of the heating furnace, the insulating member serving with the furnace core tube to enclose the heater, “the method comprising . . . lowering said rod-shaped porous glass base material through said preheating section in a period of time being greater than or equal to 4.5 hours, and through said heating section, said rod-shaped porous glass base material thereby being sintered into a transparent glass”, as recited, for example, in claim 3. (Application at paragraph [0014]). As previously mentioned, this exemplary feature may provide a method of sintering a rod-shaped

porous glass base material in which core displacement of the rod-shaped porous glass base material and elliptical deformation of the rod-shaped porous glass base material's cross-sectional shape is reduced. (Application at paragraph [0011]).

#### **A. An Exemplary Technical Advantage of the Claimed Invention**

Applicants respectfully submit that the alleged combination of Kamio, Sarkar, Walczak, Glodis, and Shimotakahara clearly fails to teach or suggest at least one of the technical advantages of the claimed invention.

Specifically, the above-referenced alleged combination, at the very least, clearly fails to teach or suggest that the core displacement and the cross-sectional shape deformation (ellipticity) of a glass base material is in any way affected or remedied by controlling the temperature variations at the inner and outer parts of the glass material during sintering.

In other words, the alleged combination fails to teach or suggest an exemplary method of sintering a rod-shaped porous glass base material such that only a small difference in temperature is observed in the cross-section of the rod-shaped porous glass base material in the radial direction, or where an even distribution of temperature of the rod-shaped porous glass base material is achieved in the radial direction. (Application at paragraph [0015]).

For example, Walczak, at paragraphs [0070]-[0073], merely suggests a preferable sintering time of 4 to 6 hours specifically for purposes of producing favorable doping results. Further, a sintering time of 6 to 12 hours being suggested by Shimotakahara at paragraph [0027] is actually part of a description of the drawbacks of the conventional optical preform with respect to the formation of bubbles within the glass layers of the conventional preform during sintering.

Indeed, the alleged combination also fails to teach or suggest the technical advantage of the claimed invention, because the alleged combination fails to teach or suggest the claimed invention.

#### **B. The Insulating Member of the Claimed Invention**

The Examiner alleges that "Kamio clearly shows sintering material 12 by lowering the base material into a heating furnace (24+26). It moves through a region from the upper edge of insulating member 24 to an upper edge of heater 26." (Office Action at page 6, third paragraph, emphasis added).

However, Kamio clearly fails to indicate that the insulating member is indicated by reference numeral 24. Specifically, at paragraph [0048], Kamio indicates that the heating unit is represented by reference numeral 24 and the heater is represented by reference numeral 26.

Thus, while Kamio does suggest that a heating unit may include “insulation material” and “a cooling unit”, these items are in no way identified by Kamio as being represented within Figure 1 and are in no way taught or suggested to be as is claimed in the present invention.

MPEP 2143.03 states that “[t]o establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.” (quoting *in re Royka*, 490 F.2d 981 (CCPA 1974), emphasis added). Therefore, the Examiner cannot rely on Kamio to teach or suggest the insulating member of the claimed invention.

Thus, because Kamio clearly fails to teach or suggest this feature, the remaining prior art references in the alleged combination must make up for this deficiency in order for the Examiner to make a *prima facie* case of obviousness. However, all of the cited prior art references fail to teach or suggest the insulating member of the claimed invention.

Specifically, Sarkar, Glodis, and Shimotakahara fail to teach anything remotely resembling the heating furnace of the claimed invention. Further, the heating device 114 of Walczak fails to teach both the heater and the insulating member of the claimed invention. Thus, none of the prior art references teach or suggest the insulating member of the claimed invention, even assuming (arguendo) combination. Therefore, the Examiner fails to make a *prima facie* case of obviousness with respect to the insulating member of the claimed invention.

### C. The Preheating Section of the Claimed Invention

The Examiner alleges that “the region above the heater would inherently and necessarily be preheated.” (Office Action at page 7, third paragraph). However, Applicants respectfully submit that the Examiner is failing to interpret this exemplary feature in view of the specification and the knowledge of one having ordinary skill in the art.

Specifically, the preheating section of the claimed invention is not simply a portion of the furnace that is preheated, as is alleged by the Examiner at page 7, second paragraph of the Office Action. The preheating section of the claimed invention exemplarily represents a region of the furnace core tube that serves in which the rod-shaped porous glass base material of the claimed invention is preheated prior to being heated by the heating section of the claimed invention. (Application at paragraph [0015]).

Exemplarily, the heater is set to a sintering temperature. (Application at paragraph [0014]). By setting the heater to a sintering temperature, the heater also heats the exemplary insulating member of the claimed invention, which, as one of ordinary skill in the art would realize, would exemplarily not emit the same amount of thermal energy as would be exemplarily emitted by the heater set to the sintering temperature.

Thus, in stark contrast with the conventional method of sintering, the claimed invention exemplarily possesses, at the very least, two separate regions in which a rod-shaped porous glass base material is exemplarily heated at two different temperatures.

Therefore, the preheating section exemplarily serves to “preheat” the rod-shaped porous glass base material at a point prior to exposure to the exemplary heating section of the claimed invention, which exemplarily may lead to, as previously stated, a method of sintering a rod-shaped porous glass base material in which core displacement of the rod-shaped porous glass base material and elliptical deformation of the rod-shaped porous glass base material’s cross-sectional shape is reduced.

While the Examiner primarily relies upon inherency and non-evidential arguments to support his interpretation, the Examiner alleges that Walczak teaches that “[i]t is known to preheat in the preform consolidation art: [0078] and [0082].” (Office Action at page 7, fourth paragraph). The Examiner does not cite any other reference with respect to this exemplary feature.

However, the entire method of sintering in Walczak is completely distinguished from that of the claimed invention. As the Examiner should be able to readily admit, the entire preform of Walczak is placed in the furnace for the preheat step. In short, as is clearly represented in paragraphs [0001]-[0006] and [0016] of the Application, to avoid temperature distribution between the outer and inner parts of the base material, Walczak teaches away from the claimed invention in that it teaches exactly what the claimed invention is trying to avoid.

Indeed, the correct interpretation of this exemplary feature of the claimed invention is completely different from the Examiner’s interpretation. Thus, the Examiner clearly alleges the inherency and the necessity of the preheating section of the claimed invention in error. Therefore, the Examiner fails to make a *prima facie* case of obviousness with respect to the preheated region of the claimed invention.

#### **D. The Time Limitation of the Claimed Invention**

The Examiner alleges that “Sarkar teaches the downfeed rate is a critical parameter and that and (sic) the larger the preform, the lower the necessary feed rate: col. 9, lines 26-32. Sarkar discloses a feed rate of 2 mm/min, which is not all that much larger than applicants 1.48 mm/min. (sic) disclosed at table 1.”

Applicants respectfully submit that, exemplarily according to the feed rates referenced above by the Examiner, 4.5 hours of operation would feed the rod-shaped porous glass base material of the claimed invention 405 mm and would feed the preform in Sarkar 540 mm. Further, if applied as suggested by the Examiner, the above-referenced feed rate of Sarkar would feed a 405 mm rod-shaped porous glass base material of the claimed invention in 3.375 hours. Thus, if performed as suggested by Sarkar, the claimed method would provide a rod-shaped porous glass base material with core displacement and cross-sectional shape deformation, as is shown at paragraph [0016] of the original specification.

The Examiner further alleges that Walczak and Shimotakahara teach various different sintering times. However, the time limitations for the sintering in Walczak and Shimotakahara are clearly not applicable to teach or suggest the time limitation of the claimed invention. Indeed, there is clearly no recognition of the exemplary preheating section of the claimed invention.

After the advancement of the previously addressed allegations, the Examiner further alleges that the time limitation of the claimed invention is a result-effective variable and, thus, is a feature that is neither inventive nor critical. (Office Action at pages 8-10). This allegation, however, is clearly in view of the Examiner’s erroneous interpretation of the claimed invention.

Furthermore, regardless of what the Examiner alleges, MPEP 2143.03 states that “[t]o establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.” (quoting *in re Royka*, 490 F.2d 981 (CCPA 1974), emphasis added). Even in view of the Examiner’s many allegations, the Examiner clearly has failed to establish that all of the exemplary limitations of the claimed invention are taught by the alleged prior art combination.

#### **F. Conclusion**

Thus, even assuming (arguendo) that one of ordinary skill in the art would combine the aforementioned cited prior art references, the resultant combination completely and clearly fails to teach or suggest a method of sintering a rod-shaped porous glass base material in a furnace

core tube, the furnace core tube having a heating section that is concentrically surrounded by a heater of a heating furnace and a preheating section that is surrounded by an insulating member of the heating furnace, the insulating member serving with the furnace core tube to enclose the heater, the method including lowering the rod-shaped porous glass base material through the preheating section in a period of time being greater than or equal to 4.5 hours, and through the heating section, the rod-shaped porous glass base material thereby being sintered into a transparent glass.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

### **III. NEW CLAIMS**

New claims 3-18 are added to claim additional features of the invention and to provide more varied protection for the claimed invention. These claims are independently patentable because of the novel and nonobvious features recited therein.

Applicants submit that the new claims are patentable over the cited prior art references at least for analogous reasons to those set forth above.

### **IV. FORMAL MATTERS AND CONCLUSION**

In view of the foregoing, Applicants submit that claims 2-18, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Applicants believe this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,



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Date: February 27, 2010

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